

FOR YOUR SAFETY

If you smell gas:

1. Open windows.
2. DO NOT try to light any appliance.
3. DO NOT use electrical switches.
4. DO NOT use any telephone in your building.
5. Leave the building.
6. Immediately call your local gas supplier after leaving the building. Follow the gas supplier's instructions.
7. If you cannot reach your gas supplier, call the Fire Department.

⚠ WARNING



Fire Hazard

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

Some objects will catch fire or explode when placed close to heater.

Failure to follow these instructions can result in death, injury or property damage.

 **ROBERTS GORDON®**

Vantage® TF

Twin Fire Unitary Infrared Heater Installation, Operation & Service Manual

TF-120

TF-160

TF-200

TF-250

TF-300

TF-350

TF-380

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can result in death, injury or property damage. Read the Installation, Operation and Service Manual thoroughly before installing or servicing this equipment.

Installation must be done by a contractor qualified in the installation and service of gas-fired heating equipment or your gas supplier.

Installer

Please take the time to read and understand these instructions prior to any installation. Installer must give a copy of this manual to the owner.

Owner

Keep this manual in a safe place in order to provide your serviceman with necessary information.



Quality in Any Language™

© Copyright 2005 Roberts-Gordon

Roberts-Gordon

1250 William Street
P.O. Box 44
Buffalo, New York 14240-0044
Telephone: 716.852.4400
Fax: 716.852.0854
Toll Free: 800.828.7450

www.rg-inc.com

P/N 190100NA Rev. F 11/05

TABLE OF CONTENTS

SECTION 1: Heater Safety	1	SECTION 10: Gas Piping	40
1.1 Manpower Requirements	1	SECTION 11: Wiring	41
SECTION 2: Installer Responsibility	2	11.1 Line Voltage Thermostat Wiring	41
2.1 Wall Tag	2	11.2 Low Voltage Thermostat and Relay Wiring.....	42
2.2 Corrosive Chemicals.....	2	11.3 Internal Wiring	42
2.3 National Standards and Applicable Codes	2	11.4 Ladder Diagram.....	43
SECTION 3: Critical Considerations	3	11.5 Electrical Connection to the Burner.....	43
3.1 Required Clearances to Combustibles.....	3	SECTION 12: Operation and Maintenance	44
SECTION 4: National Standards and Applicable Codes	7	12.1 Sequence of Operation.....	44
4.1 Gas Codes.....	7	12.2 To Shut Off Heater	44
4.2 Aircraft Hangars	7	12.3 To Start Heater	44
4.3 Public Garages	7	12.4 Pre-Season Maintenance and Annual Inspection....	44
4.4 Electrical	7	12.5 Maintenance Checklist.....	45
4.5 Venting.....	7	SECTION 13: Troubleshooting	47
4.6 High Altitude	7	13.1 Troubleshooting Flow Chart.....	47
SECTION 5: Major Components	8	13.2 Manifold Gas Pressure Setting	49
5.1 Standard Parts List	9	SECTION 14: Replacement Parts	50
SECTION 6: Suggested Layouts	11	SECTION 15: General Specifications	52
6.1 TF-380 - 4 Elbow Design (Common Vent)	11	15.1 Material Specification.....	52
6.2 TF-350 - 4 Elbow Design (Common Vent)	11	15.2 Heater Specifications.....	52
6.3 TF-300 - Double "U" Design (Common Vent)	11	15.3 Suspension Specifications.....	52
6.4 TF-160 - Single Elbow Design (Individual Vents).....	12	15.4 Controls Specifications	52
6.5 TF-160 Double "L" Design (Individual Vents).....	12	SECTION 16: The ROBERTS GORDON® VANTAGE® TF	
6.6 TF-250 - Combination "L" and "U" Design		Warranty	53
(Individual Vents)	12		
SECTION 7: Heater Installation	13		
7.1 Burner Tube Installation	18		
7.2 Burner Installation.....	18		
7.3 Tube Clamp Package Installation.....	19		
7.4 Coupling and Tube Assembly.....	19		
7.5 Turbulator Installation	21		
7.6 Reflector Installation	21		
SECTION 8: Optional Heater Accessories	23		
8.1 U-Tube Configuration	23		
8.2 Elbow Package Configuration	26		
8.3 Reflector Side Extension.....	28		
8.4 Lower Clearance Shield Installation	29		
8.5 Two-Foot Decorative Grille Installation.....	29		
8.6 One-Foot Decorative Grille Installation	31		
8.7 Protective Grille Installation.....	33		
SECTION 9: Venting	34		
9.1 Venting Requirements.....	34		
9.2 Horizontal Ventilation 4" (10 cm) Pipe.....	35		
9.3 Vertical Ventilation 4" (10 cm) Pipe.....	35		
9.4 Flexible Boot Installation (Single Vent)	36		
9.5 Common Sidewall Venting	36		
9.6 Vertical Ventilation 6" (15 cm) Pipe	37		
9.7 Flexible Boot Installation (Common Vent).....	37		
9.8 Outside Combustion Air Supply	38		

© 2005 **ROBERTS GORDON**

All rights reserved. No part of this work covered by the copyrights herein may be reproduced or copied in any form or by any means - graphic, electronic, or mechanical, including photocopying, recording, taping or information storage and retrieval systems - without the written permission of Roberts-Gordon.

TABLE OF FIGURES

Figure 1: Standard Reflector	3
Figure 2: One Side Reflector.....	4
Figure 3: Two Side Reflectors	4
Figure 4: 45° Tilt Reflector	4
Figure 5: U-Tube, Standard Reflector.....	5
Figure 6: U-Tube, 45°	5
Figure 7: U-Tube, Opposite 45° Reflector	5
Figure 8: 2-Foot Deco Grille, 1-Foot Deco Grille and Protective Grille.....	6
Figure 9: Lower Clearance Shield.....	6
Figure 10: Venting	6
Figure 11: Major Component Descriptions.....	8
Figure 12: Critical Hanger Placement	14
Figure 13: Linear Heater Assembly Overview	15
Figure 14: Linear Heater Layout Overview.....	16
Figure 15: Linear Heater Layout Overview (Continued)	17
Figure 16: U-Tube Heater Assembly Overview	23
Figure 17: U-Tube Heater Layout Overviews	24
Figure 18: U-Tube Heater Layout Overviews (Continued).....	25
Figure 19: Reflector Joint Detail	27
Figure 20: Gas Connection with Flexible Gas Hose	40

SECTION 1: HEATER SAFETY



Your Safety is Important to Us!
This symbol is used throughout the manual to notify you of possible fire, electrical or burn hazards. Please pay special attention when reading and following the warnings in these sections.

Installation, Service and Annual Inspection of heater must be done by a contractor qualified in the installation and service of gas-fired heating equipment.

Read this manual carefully before installation, operation or service of this equipment.

This heater is designed for heating nonresidential indoor spaces. Do not install in residential spaces. These instructions, the layout drawing, local codes and ordinances, and applicable standards that apply to gas piping, electrical wiring, venting, etc. must be thoroughly understood before proceeding with the installation.

Thin sheet metal parts, including the aluminum reflector portion of the heater and the various venting components, have sharp edges. To prevent injury, the use of work gloves is recommended. The use of gloves will also prevent the transfer of body oils from the hands to the surface of the reflector.

Before installation, check that the local distribution conditions, nature of gas and pressure, and adjustment of the appliance are compatible.

1.1 Manpower Requirements

To prevent personal injury and damage to the heater, two persons will be required for installation.

SECTION 2: INSTALLER RESPONSIBILITY

The installer is responsible for the following:

- To install the heater, as well as the gas and electrical supplies, in accordance with applicable specifications and codes. Roberts-Gordon recommends the installer contact a local building inspector or Fire Marshal for guidance.
- To use the information given in a layout drawing and in the manual together with the cited codes and regulations to perform the installation.
- To install the heater in accordance with the Clearances to Combustibles.
- To furnish all needed materials not furnished as standard equipment.
- To plan location of supports.
- To provide access to burners for servicing on all sides for burner removal.
- To provide the owner with a copy of this installation, operation and service manual.
- To never use heater as support for a ladder or other access equipment and never hang or suspend anything from heater.
- To ensure there is adequate air circulation around the heater and to supply air for combustion, ventilation and distribution in accordance with local codes.
- To safely and adequately install heater using materials with a minimal working load of 75 lbs (33 kg).

2.1 Wall Tag

A laminated wall tag is available for the heater as a permanent reminder of the safety instructions and the importance of the required clearances to combustibles. Please contact Roberts-Gordon or your ROBERTS GORDON® independent distributor to obtain the wall tag. Affix the tag by peeling off the backing of the adhesive strips on the rear surface and position the tag on a wall near the heater (e.g. thermostat or ROBERTS GORDON® BZC Controller).

A copy of the wall tag (P/N 91037912) is illustrated on the back cover. For an immediate solution, you may affix this copy on the wall near the heater.

Know your model number and installed configuration. Model number and installed configuration are found on the burner and in the Installation, Operation and Service Manual. See Page 3, Figure 1 through Page 6, Figure 10. Write the proper clearance dimensions

in permanent ink according to your model number and configuration in the open spaces on the tag.

2.2 Corrosive Chemicals

CAUTION

Do not use heater in an area containing corrosive chemicals.

Avoid the use of corrosive chemicals to ensure a longer life of the burner, tubing and other parts.

Failure to follow these instructions can result in property damage.

Roberts-Gordon cannot be responsible for ensuring that all appropriate safety measures are undertaken prior to installation; this is entirely the responsibility of the installer. It is essential that the contractor, the sub-contractor, or the owner identifies the presence of combustible materials, corrosive chemicals or halogenated hydrocarbons* anywhere in the premises.

** **Halogenated Hydrocarbons** are a family of chemical compounds characterized by the presence of halogen elements (fluorine, chlorine, bromine, etc.). These compounds are frequently used in refrigerants, cleaning agents, solvents, etc. If these compounds enter the air supply of the burner, the life span of the heater components will be greatly reduced. An outside air supply must be provided to the burners whenever the presence of these compounds is suspected. Warranty will be invalid if the heater is exposed to halogenated hydrocarbons.*

2.3 National Standards and Applicable Codes

All appliances must be installed in accordance with the latest revision of the applicable standards and national codes. This refers also to the electric, gas and venting installation. Note: Additional standards for installations in Public Garages, Aircraft Hangars, etc. may be applicable.

SECTION 3: CRITICAL CONSIDERATIONS

3.1 Required Clearances to Combustibles

Clearances are the required distances that combustible objects must be away from the heater to prevent serious fire hazards. Combustibles are materials, that may catch on fire and include common items such as wood, paper, rubber, fabric, etc.

Maintain clearances to combustibles at all times for safety.

Clearances for all heater models are located on the burner of the heater and on *Page 3, Figure 1 through Page 6, Figure 10* in this manual. Check the clearances on each burner for the model heater being installed to make sure the product is suitable for your application and the clearances are maintained. Read and follow the safety guidelines below:

- Keep gasoline or other combustible materials including flammable objects, liquids, dust or vapors away from this heater or any other appliance.
- Maintain clearances from heat sensitive material, equipment and workstations.
- Maintain clearances from vehicles parked below the heater.
- Maintain clearances from swinging and overhead doors, overhead cranes, vehicle lifts, partitions, storage racks, hoists, building construction, etc.
- In locations used for the storage of combustible materials, signs must be posted to specify the

⚠ WARNING



Fire Hazard

Some objects will catch fire or explode when placed close to heater.

Keep all flammable objects, liquids and vapors the required clearances to combustibles away from heater.

Failure to follow these instructions can result in death, injury or property damage.

maximum permissible stacking height to maintain required clearances from the heater to the combustibles. Signs must be posted adjacent to the heater thermostat. In the absence of a thermostat, signs must be posted in a conspicuous location.

- Consult local Fire Marshal, Fire Insurance Carrier or other authorities for approval of proposed installation when there is a possibility of exposure to combustible airborne materials or vapors.
- Hang heater in accordance to the minimum suspension requirements on *Page 14, Figure 12*.
- If the radiant tubes must pass through the building structure, be sure that adequate sleeving and fire stop is installed to prevent scorching and/or fire hazard.

NOTE: 1. All dimensions are from the surfaces of all tubes, couplings and elbows.
2. Clearances B, C and D can be reduced by 50% after 25' (7.5 m) of tubing downstream from where the burner and burner tube connect.

FIGURE 1: STANDARD REFLECTOR

	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	TF-120	6	35	63	35	16	89	161	89
	TF-160	6	38	66	38	16	97	168	97
	TF-200	6	40	71	40	16	102	181	102
	TF-250	6	46	77	46	16	117	196	117
	TF-300	6	50	80	50	16	127	204	127
	TF-350	8	52	82	52	21	133	209	133
	TF-380	8	52	82	52	21	133	209	133

- NOTE:** 1. All dimensions are from the surfaces of all tubes, couplings and elbows.
 2. Clearances B, C and D can be reduced by 50% after 25' (7.5 m) of tubing downstream from where the burner and burner tube connect.

FIGURE 2: ONE SIDE REFLECTOR

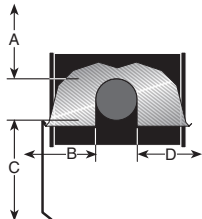
	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	TF-120	6	9	63	47	16	23	161	120
	TF-160	6	9	70	54	16	23	178	138
	TF-200	6	9	77	59	16	23	196	150
	TF-250	6	9	83	65	16	23	211	166
	TF-300	6	9	86	69	16	23	219	176
	TF-350	8	9	88	73	21	23	224	186
	TF-380	8	9	88	73	21	23	224	186

FIGURE 3: TWO SIDE REFLECTORS

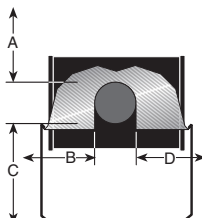
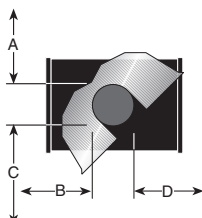
	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	TF-120	6	23	66	23	16	59	168	59
	TF-160	6	25	72	25	16	64	183	64
	TF-200	6	27	78	27	16	69	199	69
	TF-250	6	32	84	32	16	82	214	82
	TF-300	6	35	88	35	16	89	224	89
	TF-350	8	40	91	40	21	102	232	102
	TF-380	8	40	91	40	21	102	232	102

FIGURE 4: 45° TILT REFLECTOR

	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	TF-120	8	8	60	54	21	21	153	138
	TF-160	8	8	66	60	21	21	168	153
	TF-200	10	8	74	64	26	21	188	163
	TF-250	10	8	78	69	26	21	199	176
	TF-300	12	8	84	74	31	21	214	188
	TF-350	12	8	85	79	31	21	216	201
	TF-380	12	8	85	79	31	21	216	201

- NOTE:** 1. All dimensions are from the surfaces of all tubes, couplings and elbows.
 2. Clearances B, C and D can be reduced by 50% after 25' (7.5 m) of tubing downstream from where the burner and burner tube connect.

FIGURE 5: U-TUBE, STANDARD REFLECTOR

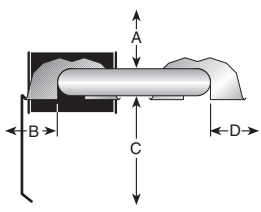
	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	TF-120	6	35	63	30	16	89	161	77
	TF-160	6	38	69	37	16	97	176	94
	TF-200	6	40	76	39	16	102	194	100
	TF-250	6	46	79	43	16	117	201	110
	TF-300	6	50	84	47	16	127	214	120
	TF-350	8	54	87	51	21	138	221	130
	TF-380	8	54	87	51	21	138	221	130

FIGURE 6: U-TUBE, 45°

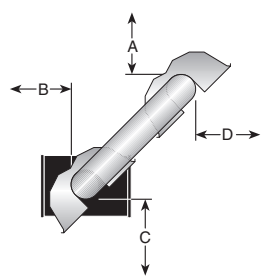
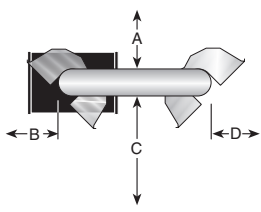
	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	TF-120	8	8	60	42	21	21	153	107
	TF-160	8	8	66	46	21	21	168	117
	TF-200	8	8	74	52	21	21	188	133
	TF-250	8	8	78	61	21	21	199	155
	TF-300	8	8	84	66	21	21	214	168
	TF-350	8	8	85	70	21	21	216	178
	TF-380	8	8	85	70	21	21	216	178

FIGURE 7: U-TUBE, OPPOSITE 45° REFLECTOR

	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	TF-120	8	54	60	22	21	138	153	56
	TF-160	8	60	66	22	21	153	168	56
	TF-200	10	64	74	22	26	163	188	56
	TF-250	10	70	78	22	26	178	199	56
	TF-300	12	74	84	22	31	188	214	56
	TF-350	12	76	85	22	31	194	216	56
	TF-380	12	76	85	22	31	194	216	56

- NOTE:** 1. All dimensions are from the surfaces of all tubes, couplings and elbows.
 2. Clearances B, C and D can be reduced by 50% after 25' (7.5 m) of tubing downstream from where the burner and burner tube connect.

FIGURE 8: 2-FOOT DECO GRILLE, 1-FOOT DECO GRILLE AND PROTECTIVE GRILLE

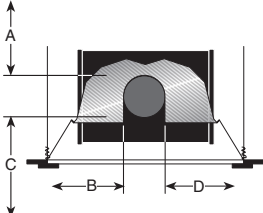
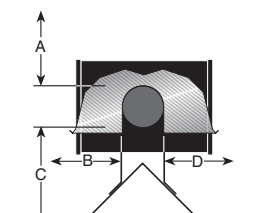
	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	TF-120	6	35	63	35	16	89	161	89
	TF-160	6	38	66	38	16	97	168	97
	TF-200	6	40	71	40	16	102	181	102
	TF-250	6	46	77	46	16	117	196	117
	TF-300	6	50	80	50	16	127	204	127
	TF-350	8	52	82	52	21	133	209	133
	TF-380	8	52	82	52	21	133	209	133

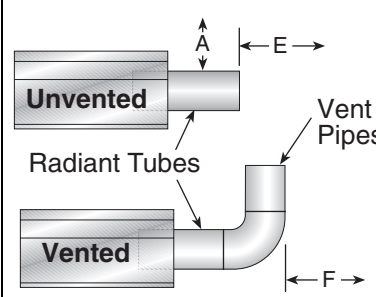
FIGURE 9: LOWER CLEARANCE SHIELD*

	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	TF-120	6	39	33	39	16	100	84	100
	TF-160	6	40	38	40	16	102	97	102
	TF-200	6	50	44	50	16	127	112	127
	TF-250	6	54	48	54	16	138	122	138
	TF-300	6	55	50	55	16	140	127	140
	TF-350**	Unapproved				Unapproved			
	TF-380**	Unapproved				Unapproved			

*When installed in the first 20' (6 m) on each side of the burner.

**Roberts-Gordon prohibits the installation of this heater for all unapproved applications.

FIGURE 10: VENTING

	Model	(inches)			(centimeters)		
		A	E	F	A	E	F
	TF-120	14	18	18	36	46	46
	TF-160	20	24	18	51	61	46
	TF-200	20	24	18	51	61	46
	TF-250	20	24	18	51	61	46
	TF-300	20	30	18	51	77	46
	TF-350	20	30	18	51	77	46
	TF-380	20	30	18	51	77	46

SECTION 4: NATIONAL STANDARDS AND APPLICABLE CODES

4.1 Gas Codes

The type of gas appearing on the nameplate must be the type of gas used. Installation must comply with national and local codes and requirements of the local gas company.

United States: Refer to National Fuel Gas Code, ANSI Z223.1 - latest revision (same as NFPA 54).

Canada: Refer to CAN/CGA B149.1 and B149.2: Installation Codes for Gas Burning Appliances.

4.2 Aircraft Hangars

Installation in aircraft hangars must be in accordance with the following codes:

United States: Refer to Standard for Aircraft Hangars, ANSI/NFPA 409 - latest revision.

Canada: Refer to Standard CAN/CGA B149.1 and B149.2.

- In aircraft storage and servicing areas, heaters shall be installed at least 10' (3 m) above the upper surface of wings or of engine enclosures of the highest aircraft which may be housed in the hangar. The measurement shall be made from the wing or engine enclosure (whichever is higher from the floor), to the bottom of the heater.
- In shops, offices and other sections of aircraft hangars communicating with aircraft storage or servicing areas, heaters shall be installed not less than 8' (2.4 m) above the floor.
- Suspended or elevated heaters shall be so located in all spaces of aircraft hangars that they shall not be subject to injury by aircraft, cranes, movable scaffolding or other objects. Provisions shall be made to assure accessibility to suspended heaters for recurrent maintenance purposes.

4.3 Public Garages

Installation in garages must be in accordance with the following codes:

United States: Standard for Parking Structures NFPA 88A - latest revision or the Code for Motor Fuel Dispensing Facilities and Repair Garages, NFPA 30A - latest revision. Canada: Refer to CAN/CGA B149.1 and B149.2: Installation Codes for Gas Burning Appliances.

- Heaters must not be installed less than 8' (2.4 m) above the floor. Minimum clearances to combustibles must be maintained from vehicles parked below the heater.
- When installed over hoists, minimum clearances to combustibles must be maintained from the upper most point of objects on the hoist.

4.4 Electrical

The heater must be electrically grounded in accordance with the following codes:

United States: Refer to National Electrical Code®, ANSI/NFPA 70 - latest revision. Wiring must conform to the most current National Electrical Code®, local ordinances and any special diagrams furnished.

Canada: Refer to Canadian Electrical Code, CSA C22.1 Part 1 - latest revision.

4.5 Venting

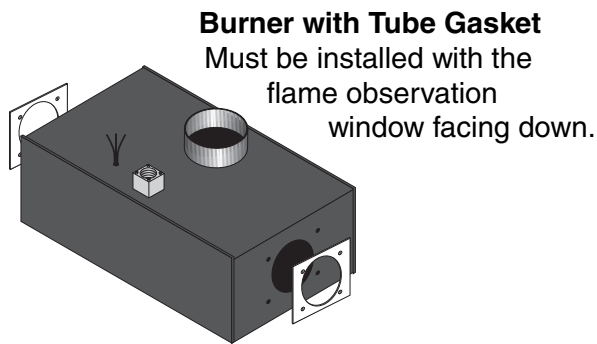
The venting must be installed in accordance with the requirements within this manual and the following codes:

United States: Refer to NFPA 54/ANSI Z223.1 - latest revision, National Fuel Gas Code.

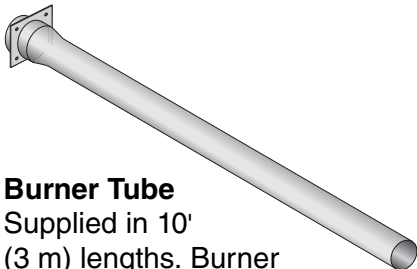
Canada: Refer to CAN/CGA B149.1 and B149.2: Installation Codes for Gas Burning Appliances

4.6 High Altitude

These heaters are approved for installations up to 2000' (US), 4500' (Canada) without modification. Consult factory if US installation is above 2000' (610 m) or Canadian installation is above 4500' (1370 m).

SECTION 5: MAJOR COMPONENTS**FIGURE 11: Major Component Descriptions**

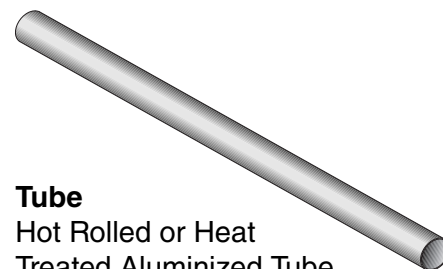
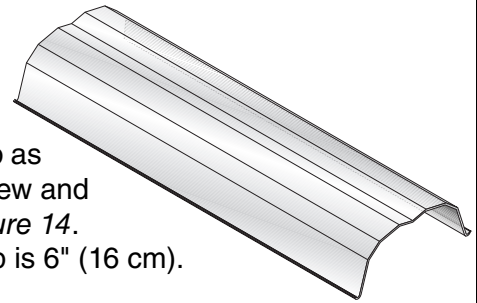
Burner with Tube Gasket
Must be installed with the flame observation window facing down.



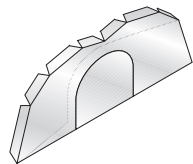
Burner Tube
Supplied in 10' (3 m) lengths. Burner tube is always the first tube after the burner.

Reflector (Aluminum or Stainless Steel)

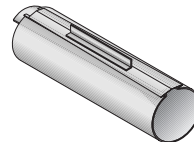
Alternate overlap as shown on overview and on Page 16, Figure 14. Minimum overlap is 6" (16 cm).



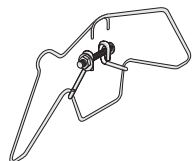
Tube
Hot Rolled or Heat Treated Aluminized Tube
Supplied in 10' (3 m) lengths.



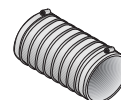
Reflector End Cap
Punch out center section to accommodate tube.



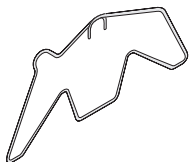
Coupling Assembly with Lock



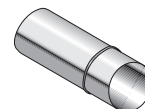
Tube and Reflector Hanger with Clamp Package
Position this hanger no more than 4" (10 cm) away from the burner.



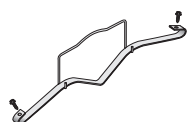
Flexible Boot
Flexible boot is used to connect the last tube to the vent.



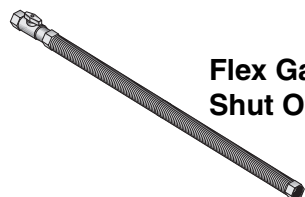
Tube and Reflector Hanger
Suspend system from these hangers.



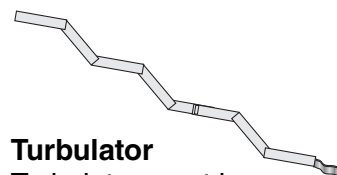
Vent Sleeve
Vent Sleeve installed inside flexible boot.



Reflector Support Strap & Wire Form



Flex Gas Line with Shut Off Cock



Turbulator
Turbulator must be installed in the last standard section of tube. Turbulator is not required on the TF-250/300/350/380. For installation see Page 21, Section 7.5.

5.1 Standard Parts List

Table 1: Contents of Burner Carton

Part No.	Description	TF-120	TF-160	TF-200	TF-250	TF-300	TF-350	TF-380
090XXXXX	Burner Assembly (Rate and Fuel Varies)	1	1	1	1	1	1	1
02568200	Gasket (Burner to Burner Tube)	1	1	1	1	1	1	1
190100NA	Installation, Operation and Service Manual	1	1	1	1	1	1	1
94273914	Hex Head Bolts 5/16-18 Rolok	8	8	8	8	8	8	8
96411600	Split Lock washer	8	8	8	8	8	8	8
*91412203	Flexible Stainless Steel Gas Hose - 3/4" NPT (US Models Only)	1	1	1	1	1	1	1
03051503	Turbulator Adapter	2	2	2	-	-	-	-
03051504	Turbulator 2.5' (76 cm) Aluminized Steel	8	8	4	-	-	-	-
91412800	Flexible Boot	2	2	2	2	2	2	2
91901300	Boot Clamp	4	4	4	4	4	4	4
09080000	Vent Sleeve	2	2	2	2	2	2	2

*Canadian Models: Rubber (Type 1) Gas Hoses available as an accessory. See Page 40, Section 10.

Table 2: Contents of Core and Extension Packages

		Core Packages						Extension Packages														
		Hot Rolled with Aluminum Reflector			Aluminized with Aluminum Reflector			Aluminized with Stainless Steel Reflector			Hot Rolled with Aluminum Reflector			Aluminized with Aluminum Reflector			Aluminized with Stainless Steel Reflector					
Part No.	Description	20' (6m)	30' (9m)	40' (12m)	20' (6m)	30' (9m)	40' (12m)	20' (6m)	30' (9m)	40' (12m)	10' (3m)	20' (6m)	30' (9m)	40' (12m)	10' (3m)	20' (6m)	30' (9m)	40' (12m)	10' (3m)	20' (6m)	30' (9m)	40' (12m)
91409300	Tube, Hot Rolled Steel, 10' (3m)	1	2	3	-	-	-	-	-	-	1	2	3	4	-	-	-	-	-	-	-	-
91409408	Tube, HT Aluminized, 10' (3m)	-	-	-	1	2	3	1	2	3	-	-	-	-	1	2	3	4	1	2	3	4
03051101	Burner Tube, ALUMI-THERM® Steel, 10' (3m)	-	1	1	-	1	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
03051601	Burner Tube, HT ALUMI-THERM® Steel, 10' (3m)	1	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01312700	Coupling Assembly	1	2	3	1	2	3	1	2	3	1	2	3	4	1	2	3	4	1	2	3	4
02750303	Standard Reflector, 8' (3.5m)	3	4	6	3	4	6	-	-	-	2	3	4	6	2	3	4	6	-	-	-	-
02750800	End Cap	2	2	2	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
027503SS	Stainless Steel Reflector, 8' (3.5m)	-	-	-	-	-	-	3	4	6	-	-	-	-	-	-	-	-	2	3	4	6
027508SS	Stainless Steel End Cap	-	-	-	-	-	-	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
03090100	Tube and Reflector Hanger	3	4	5	3	4	5	3	4	5	1	2	3	4	1	2	3	4	1	2	3	4
91907302	S-Hook	6	8	10	6	8	10	6	8	10	2	4	6	8	2	4	6	8	2	4	6	8
03050010	Reflector Support Package (Strap, Wire Form, Screws)	2	3	5	2	3	5	4	5	7	2	3	4	6	2	3	4	6	2	3	4	6
91107720	U-Clip Package	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
90502700	Vent Adapter (Not required for TF Models)	1	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-
01318901	Tube Clamp Package	1	1	1	1	1	1	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
Part Number		CP20HRS	CP30HRS	CP40HRS	CP20ALUM	CP30ALUM	CP40ALUM	CP20ALUMSS	CP30ALUMSS	CP40ALUMSS	EXP10HRS	EXP20HRS	EXP30HRS	EXP40HRS	EXP10ALUM	EXP20ALUM	EXP30ALUM	EXP40ALUM	EXP10ALUMSS	EXP20ALUMSS	EXP30ALUMSS	EXP40ALUMSS

Table 3: Component Package Guide

	Tubing Length Each Side	Core Packages (2 Required)		
Model	Minimum	Hot Rolled with Aluminum Reflector	Aluminized with Aluminum Reflector	Aluminized with Stainless Steel Reflector
TF-120	20' (6 m)	CP20HRS	CP20ALUM	CP20ALUMSS
TF-160	20' (6 m)	CP20HRS	CP20ALUM	CP20ALUMSS
TF-200	30' (9 m)	CP30HRS	CP30ALUM	CP30ALUMSS
TF-250	40' (12 m)	CP40HRS	CP40ALUM	CP40ALUMSS
TF-300	50' (15 m)	CP30HRS + EXP20HRS	CP30ALUM + EXP20ALUM	CP30ALUMSS + EXP20ALUMSS
TF-350	50' (15 m)	CP30HRS + EXP20HRS	CP30ALUM + EXP20ALUM	CP30ALUMSS + EXP20ALUMSS
TF-380	60' (18 m)	CP30HRS + EXP30HRS	CP30ALUM + EXP30ALUM	CP30ALUMSS + EXP30ALUMSS

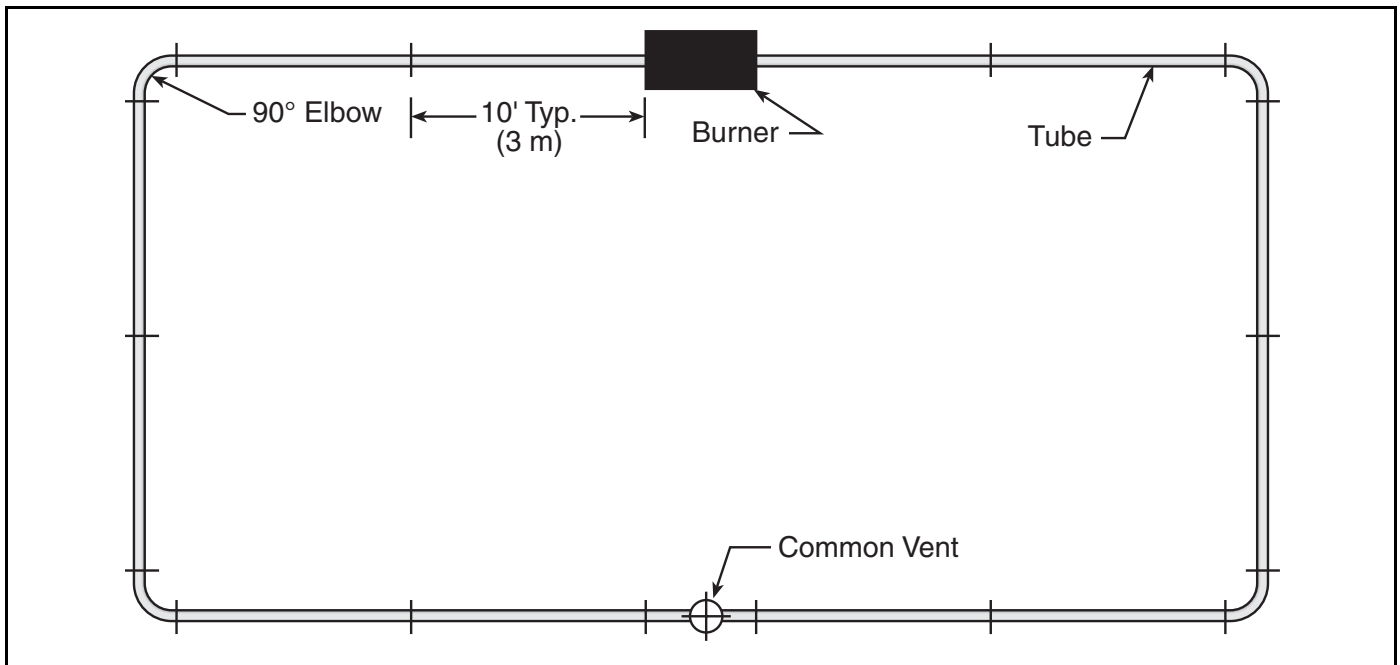
Additional tubing length may be added to heater. Tubing must be heat-treated, aluminized or porcelain coated. Any additional tubing lengths are considered as vent length for length determination. Maximum venting length for minimum heater length is 45' (13.7 m), or 22.5' (7 m) on each tube.

SECTION 6: SUGGESTED LAYOUTS

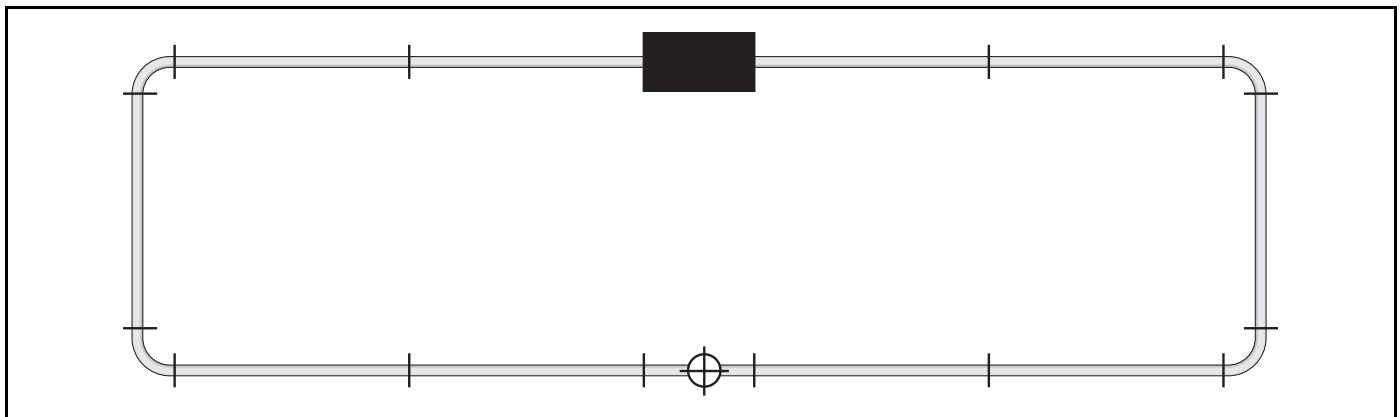
The following are suggested layouts for the heater. These layouts are effective in maximizing the heat pattern and overall performance of the heater. All heaters can be common vented or individually vented (*See Page 34, Section 9*) depending on the building requirements. These are only suggested layouts. The heater can be designed in various configurations provided they are in the guidelines of this manual. When designing a U-Tube or Elbow configuration, the following rules must be adhered to:

- A minimum of 10' (3 m) of tubing on TF-120/160 and/or a minimum of 15' (4.5 m) of tubing on the TF-200/250/300/350/380 is required between the burner and the Elbow or U Tube.
- The design and installation must adhere to the rules and guidelines located in this manual (*See Section 7 and Section 9*).
- Review venting options before selecting a layout.

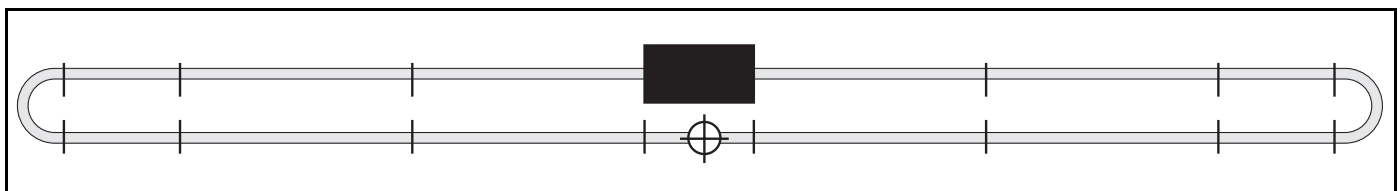
6.1 TF-380 - 4 Elbow Design (Common Vent)



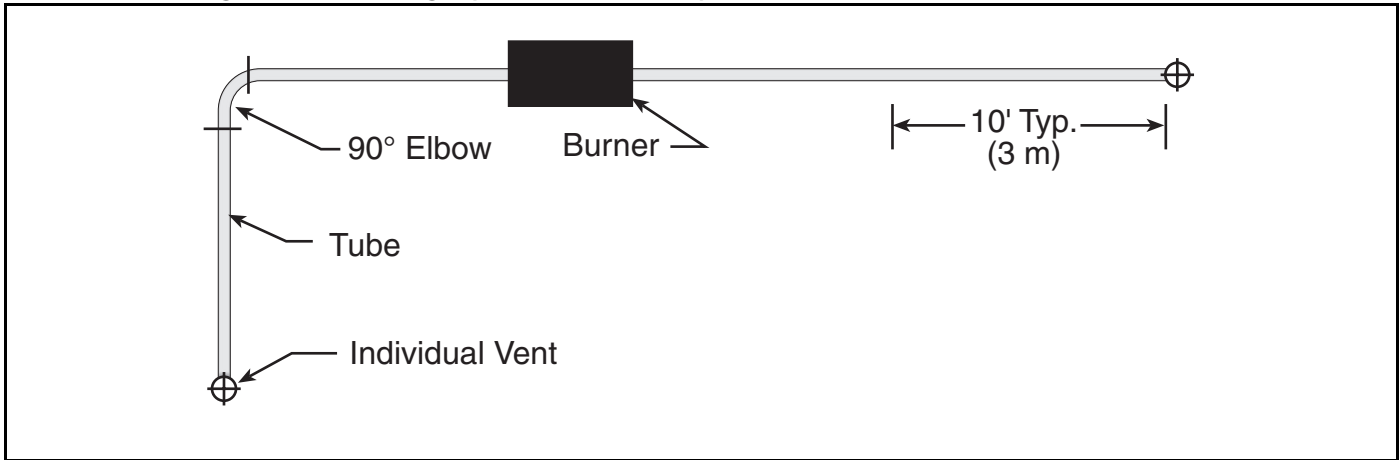
6.2 TF-350 - 4 Elbow Design (Common Vent)



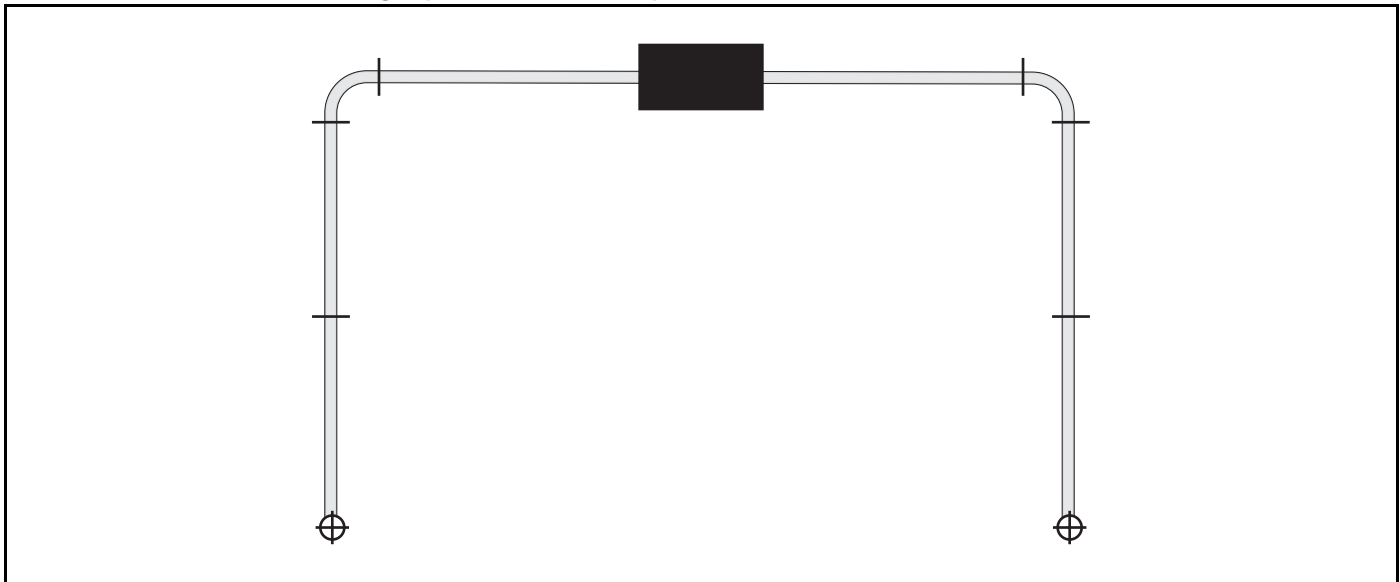
6.3 TF-300 - Double "U" Design (Common Vent)



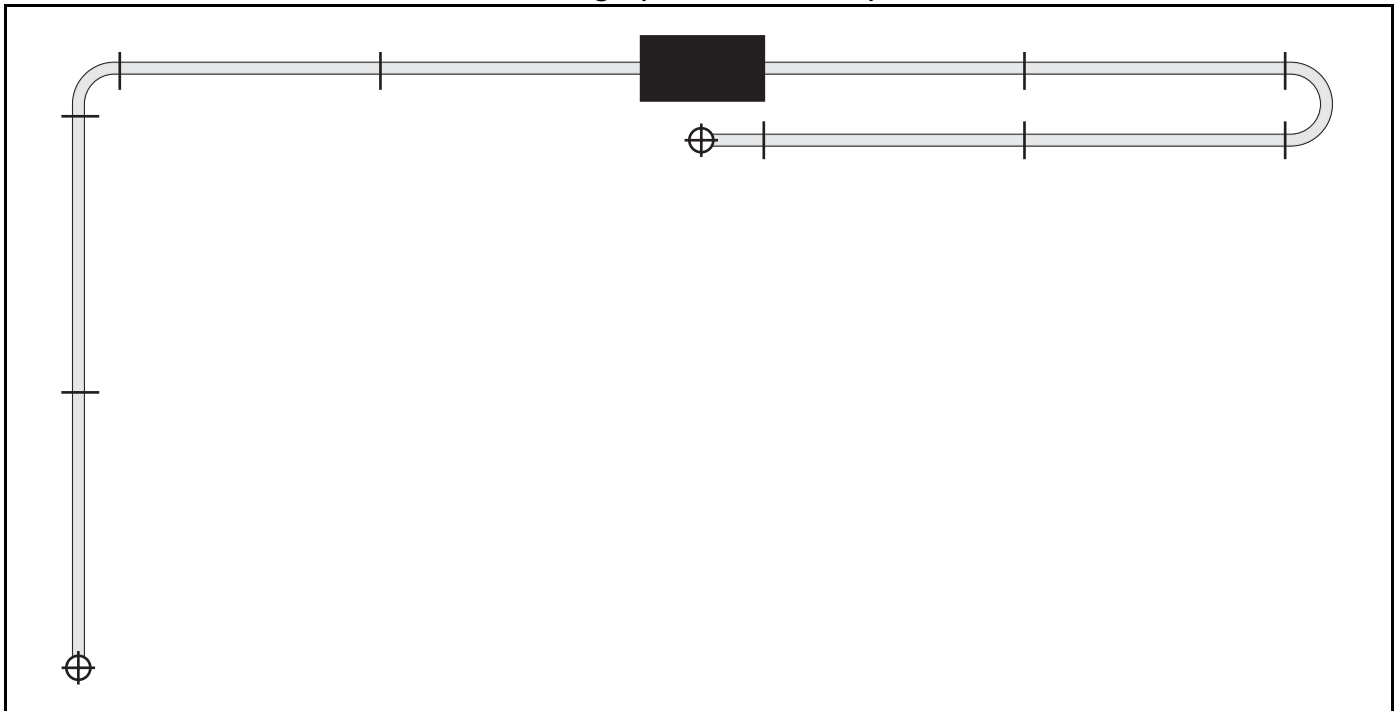
6.4 TF-160 - Single Elbow Design (Individual Vents)




6.5 TF-160 Double "L" Design (Individual Vents)



6.6 TF-250 - Combination "L" and "U" Design (Individual Vents)



SECTION 7: HEATER INSTALLATION

⚠ WARNING	
	Suspension Hazard
	Burner is secured to burner tube by bolts and lockwashers.
	Hang heater with materials with a minimum working load of 75 lbs (33 kg).
	Failure of the supports can result in death, injury or property damage.

To ensure your safety, and comply with the terms of the warranty, all units must be installed in accordance with these instructions.

The gas or the electrical supply lines must not be used to support the heater.

Do not locate the gas or electrical supply lines directly over the path of the flue products from the heater.

The heater must be installed in a location that is readily accessible for servicing.

The heaters must be installed in accordance with clearances to combustibles as indicated on the rating plate and in this instruction manual.

The minimum and maximum gas inlet pressures must be maintained as indicated on the rating plate.

Typical installation configurations are shown on Page 14, Figure 12.

Expansion and contraction of the tube dictates that the minimum suspension lengths in the table on Page 14, Figure 12 be maintained.

FIGURE 12: Critical Hanger Placement

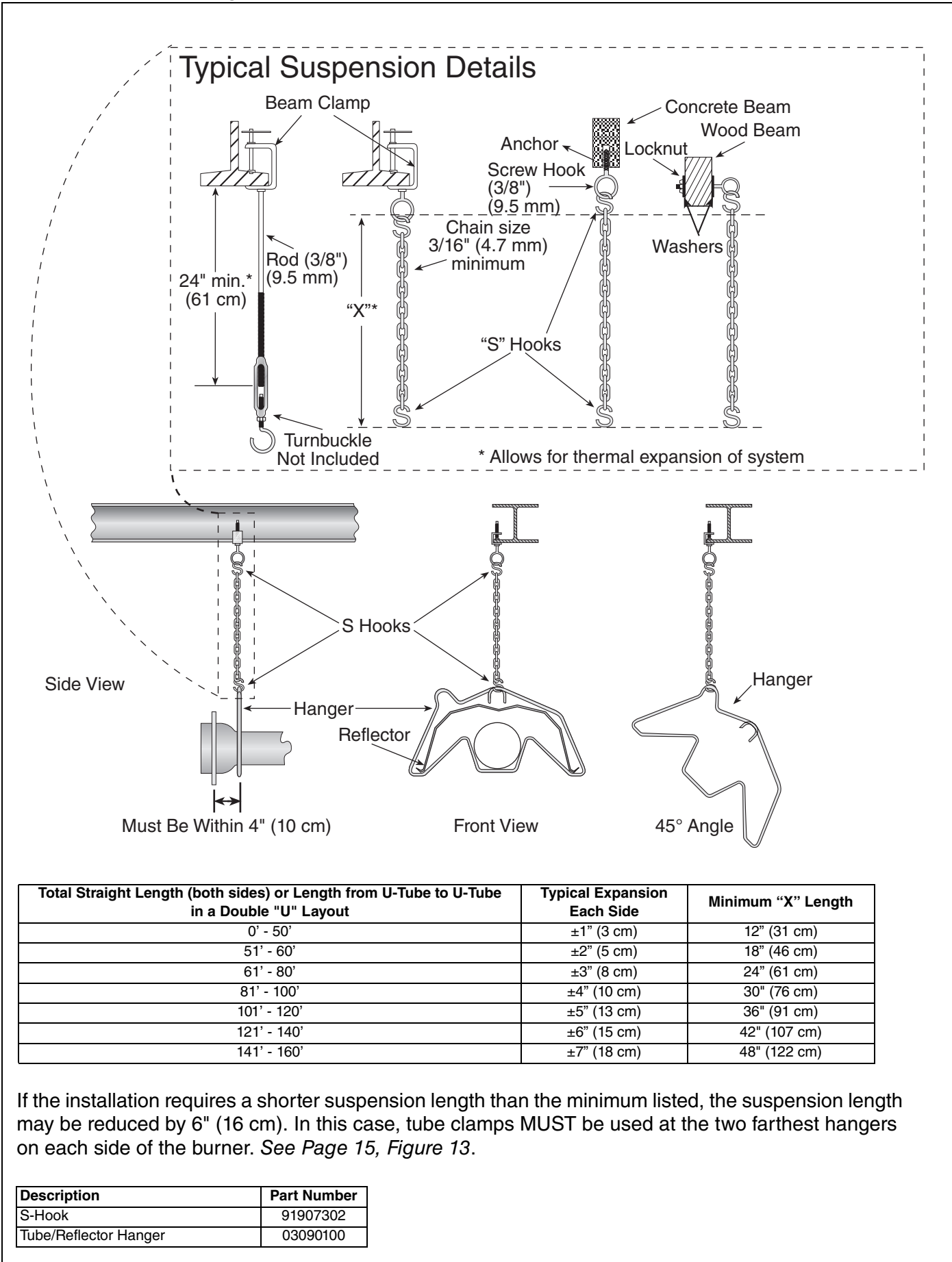


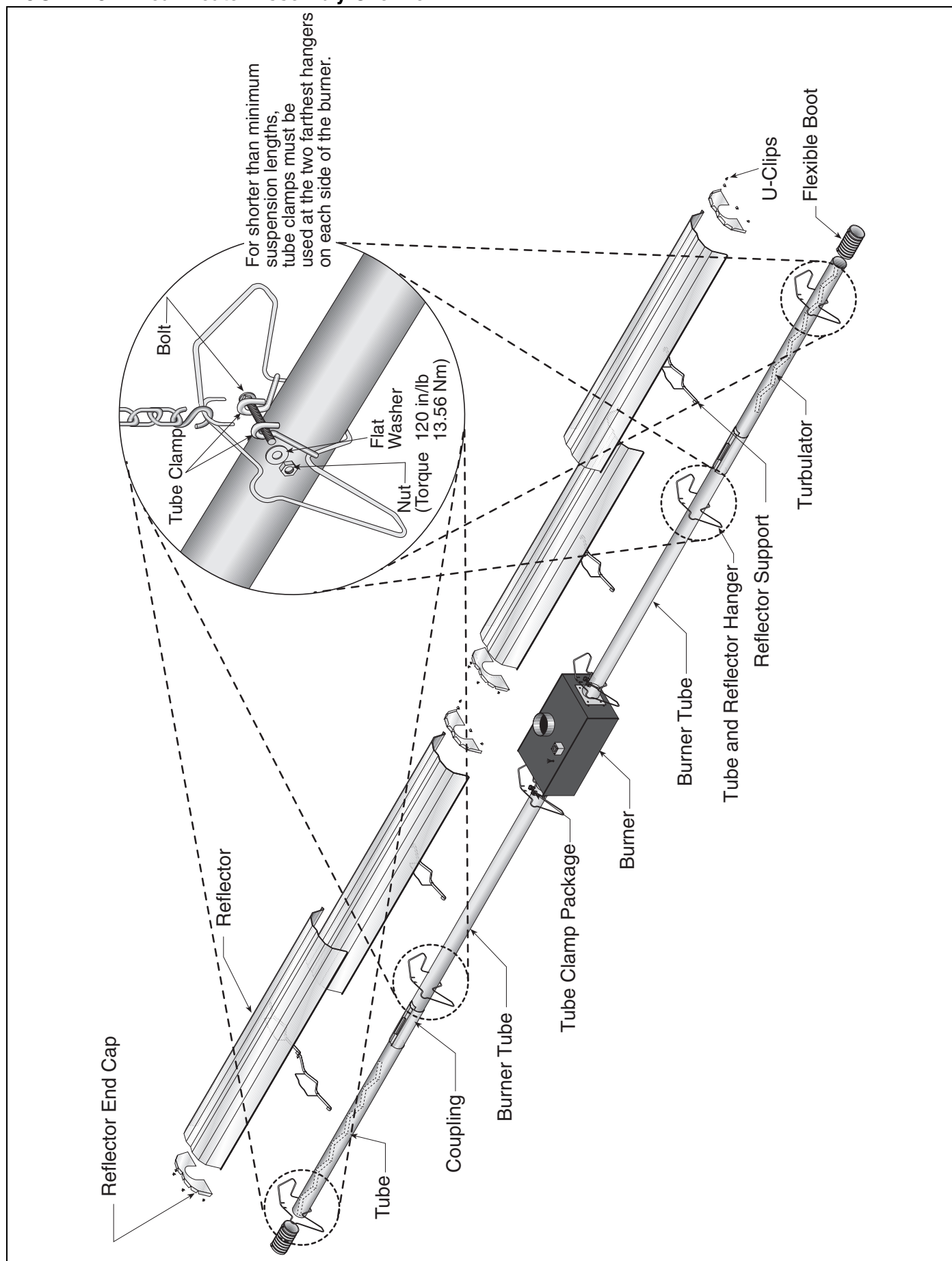
FIGURE 13: Linear Heater Assembly Overview

FIGURE 14: Linear Heater Layout Overview

Linear layouts showing one side. Use same measurements for the other side.

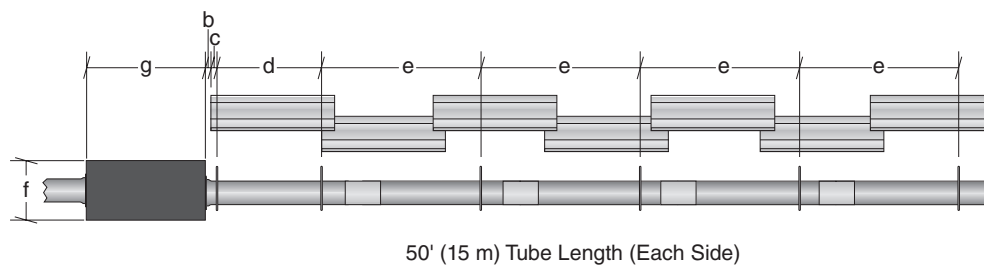
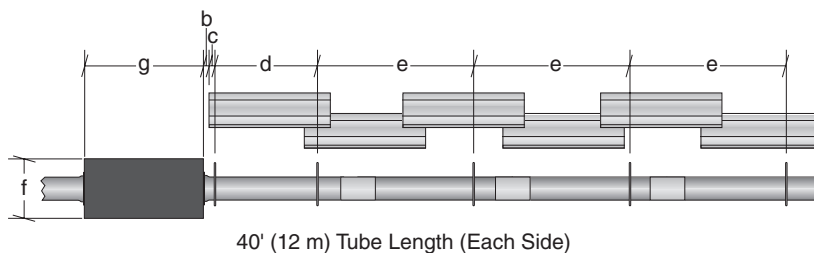
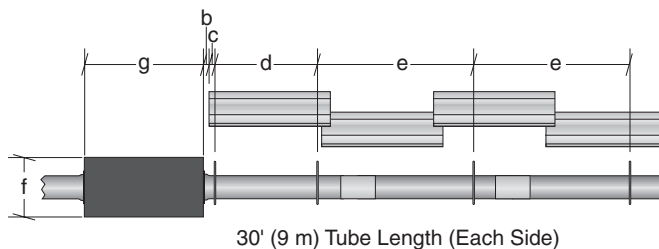
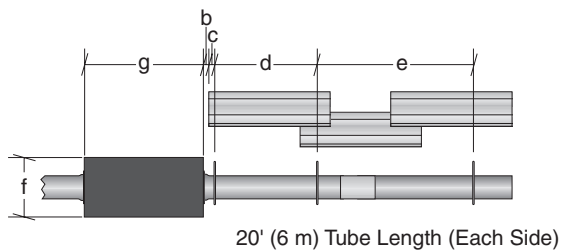
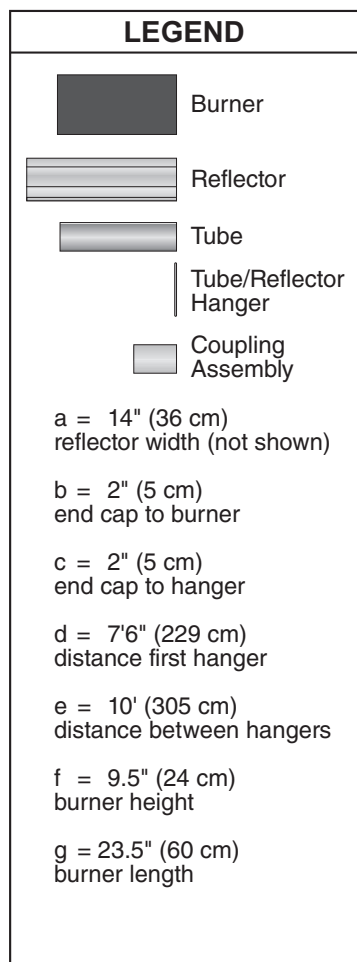
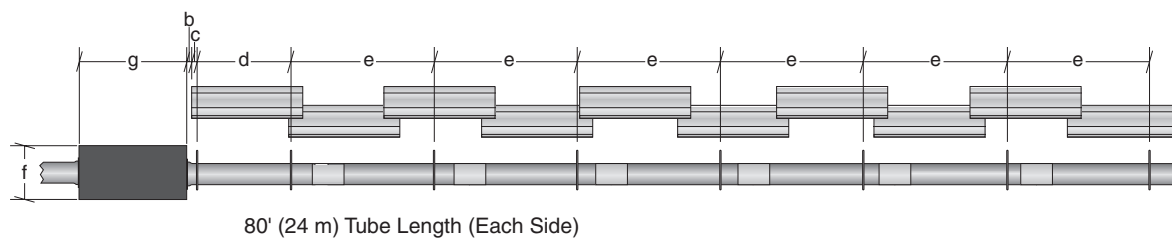
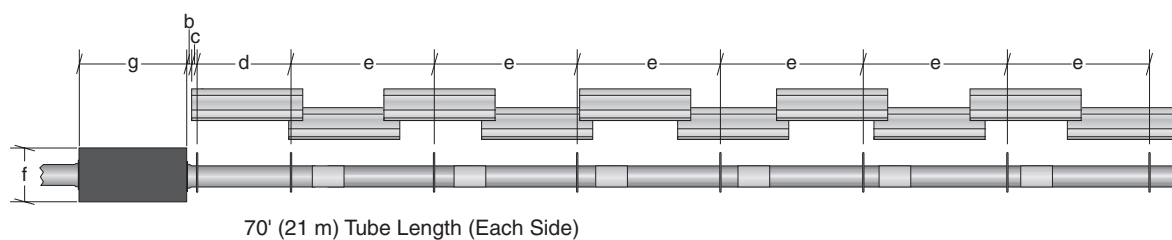
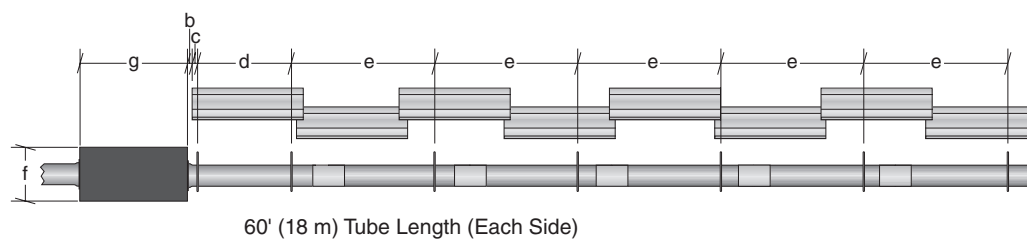
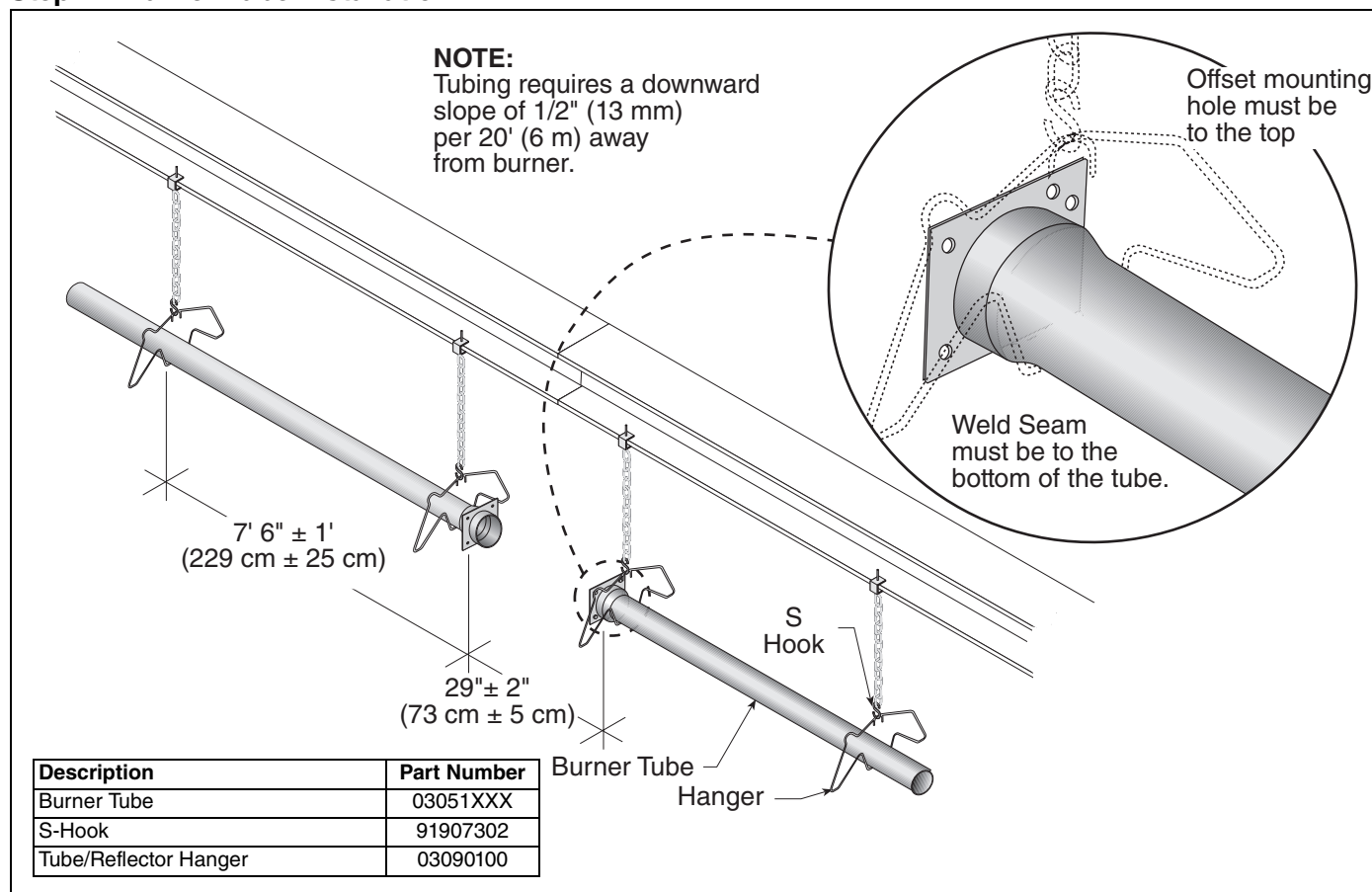
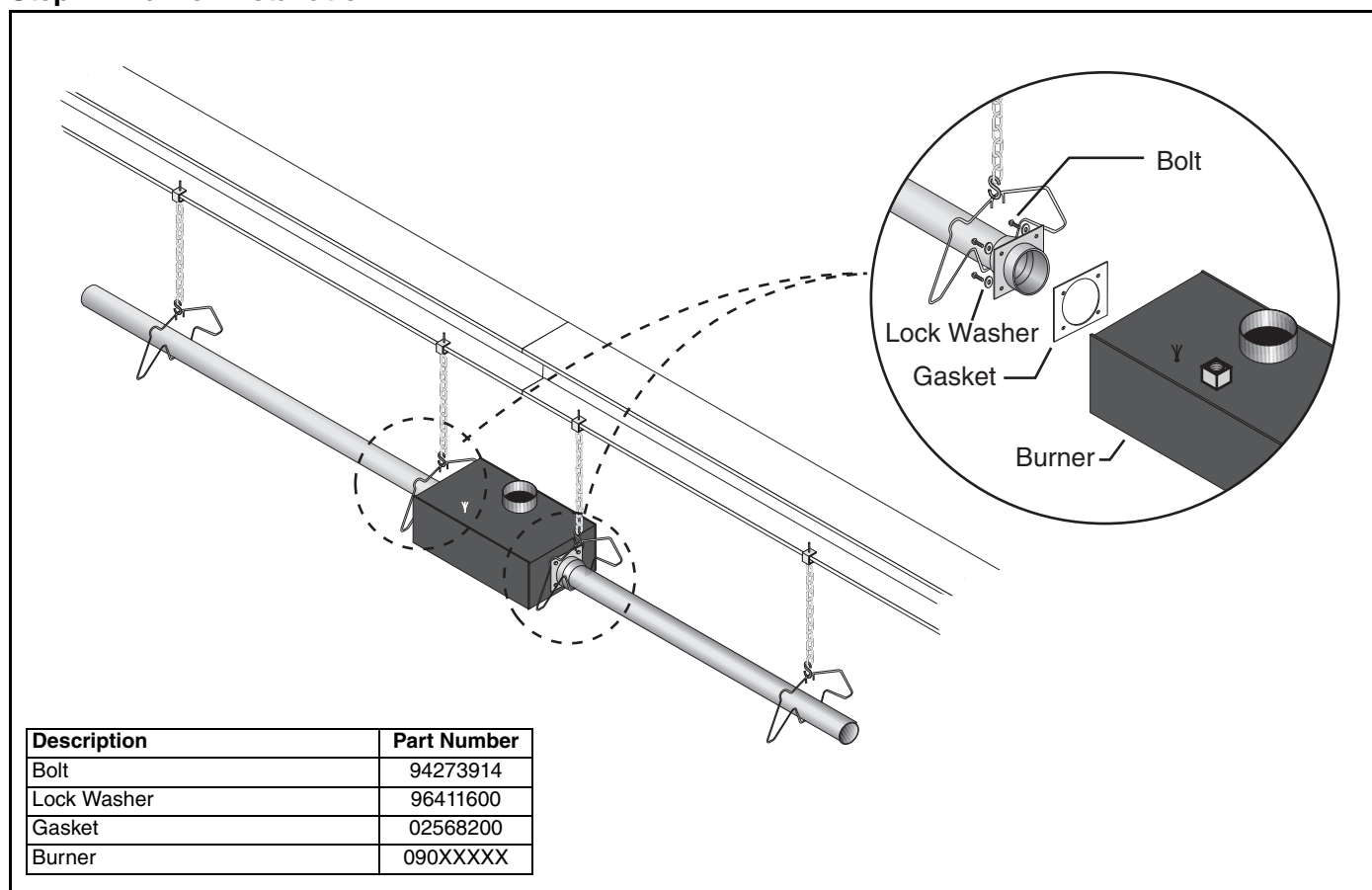


FIGURE 15: Linear Heater Layout Overview (Continued)

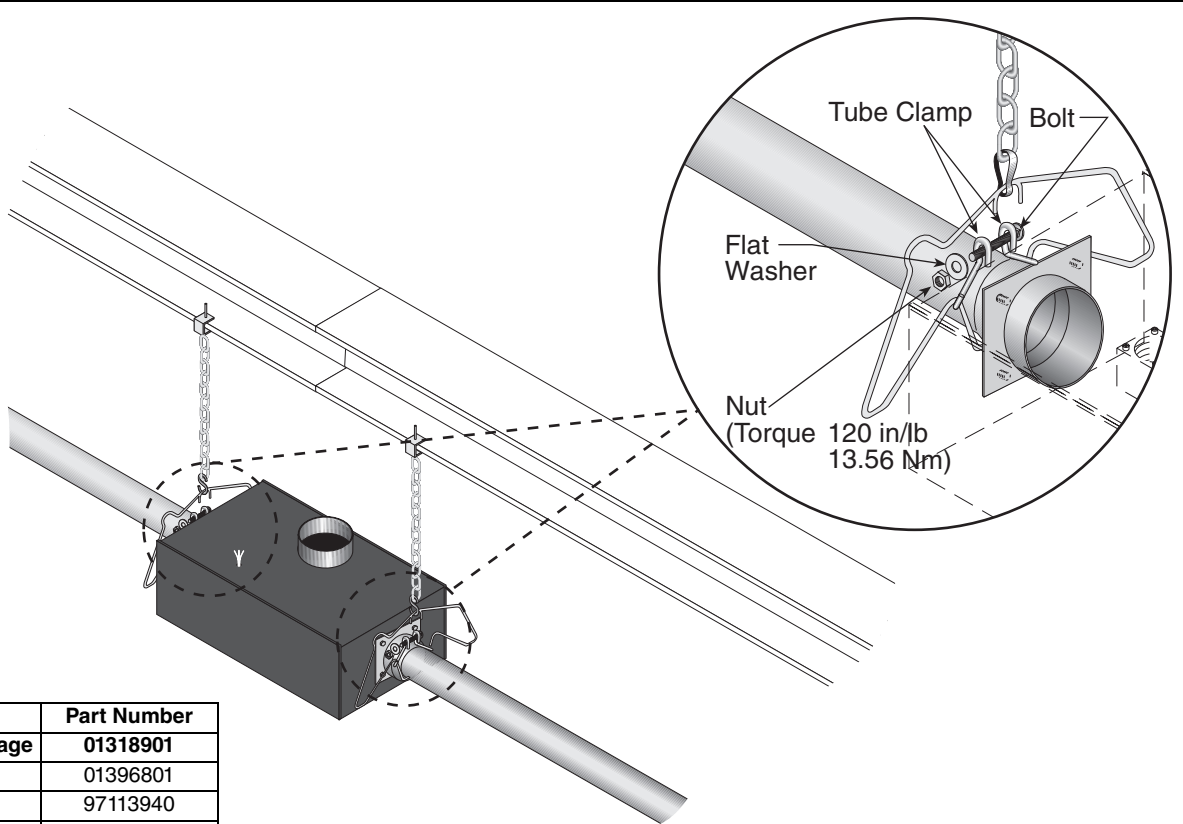
Step 7.1 Burner Tube Installation



Step 7.2 Burner Installation



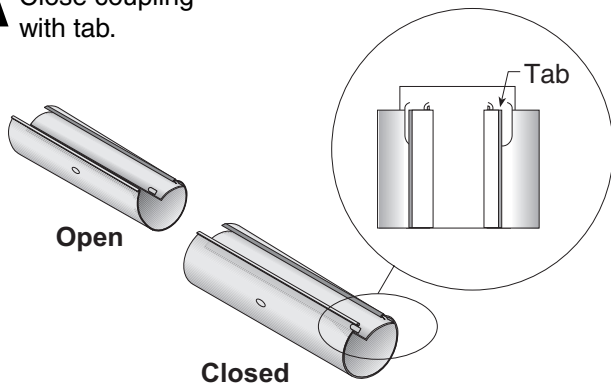
Step 7.3 Tube Clamp Package Installation



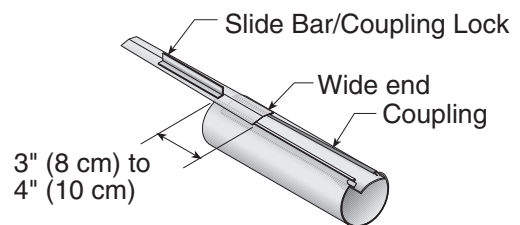
Description	Part Number
Tube Clamp Package	01318901
Tube Clamp	01396801
Bolt	97113940
Flat Washer	95211600
Nut	92113900

Step 7.4 Coupling and Tube Assembly

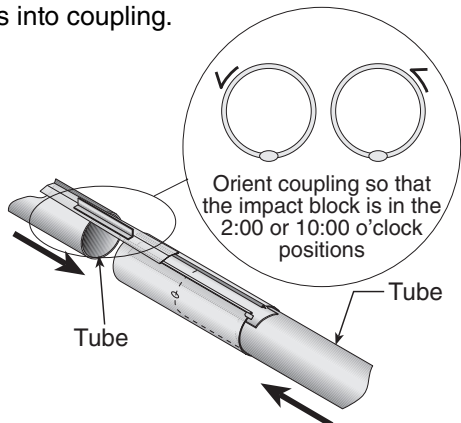
A Close coupling with tab.



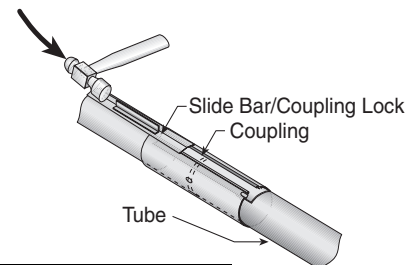
B Start Slide bar/Coupling Lock onto coupling.



C Insert tubes into coupling.



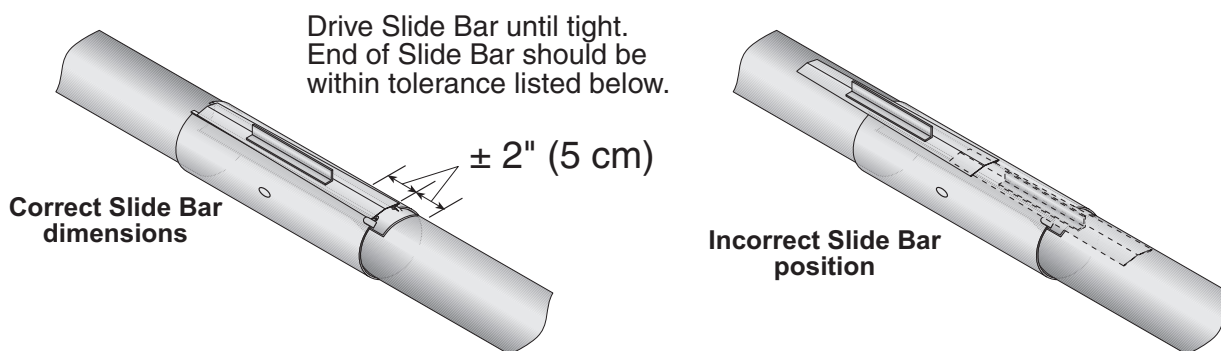
D Tighten coupling to join tubes.



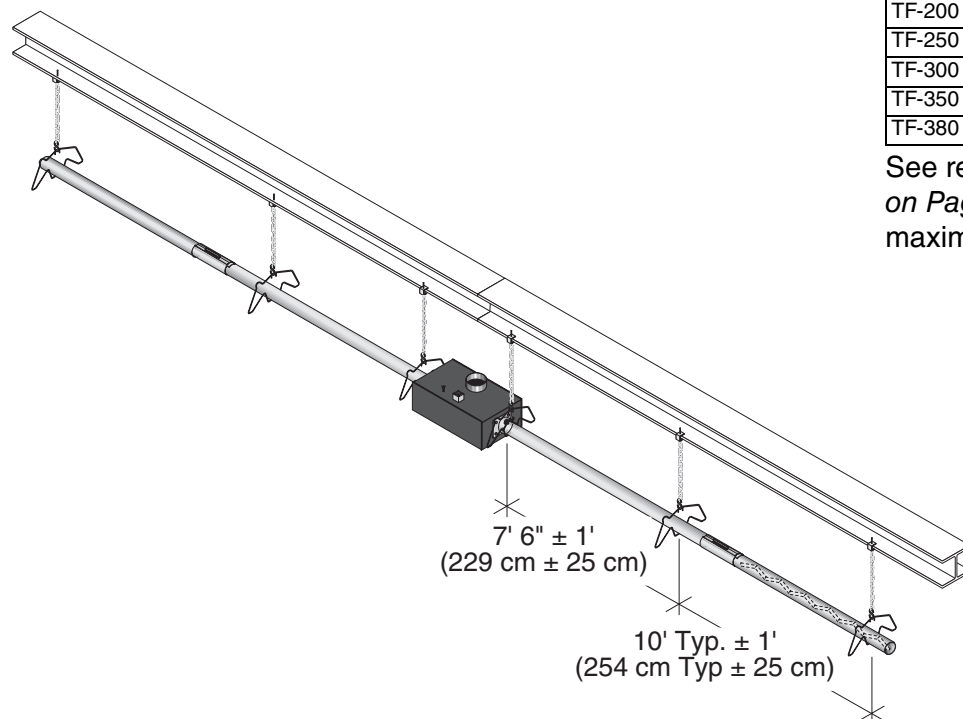
Description	Part Number
Coupling	01329600
Slide bar/Coupling Lock	01329700
Tube	91409XXX

Step 7.4.1 Coupling and Tube Assembly (Continued)

Tighten slide bar as shown below



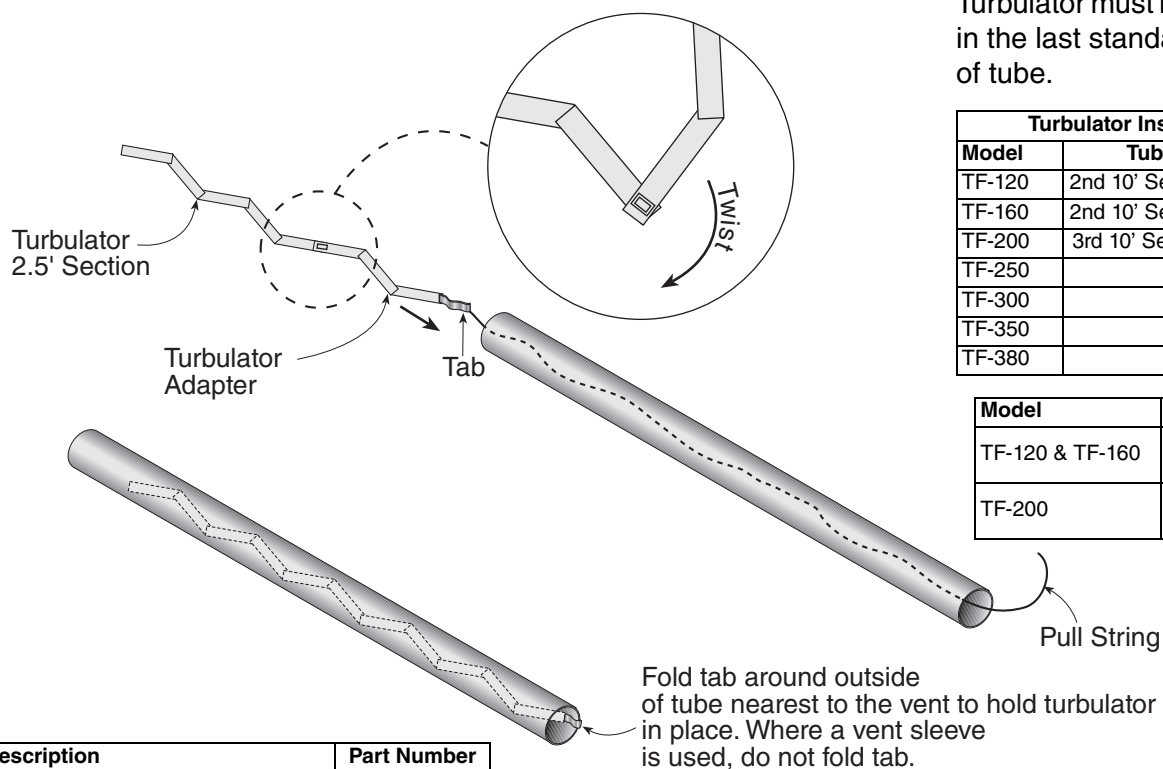
- Repeat Step 7.4 A - D until all tubes are assembled. See Page 20, Section 7.4.2.

Step 7.4.2 Coupling and Tube Assembly (Continued)

Model	Minimum Tube Length Per Side
TF-120	20' (6 m)
TF-160	20' (6 m)
TF-200	30' (9 m)
TF-250	40' (12 m)
TF-300	50' (15 m)
TF-350	50' (15 m)
TF-380	60' (18 m)

See recommended venting lengths on Page 34, Section 9, when using maximum tube lengths.

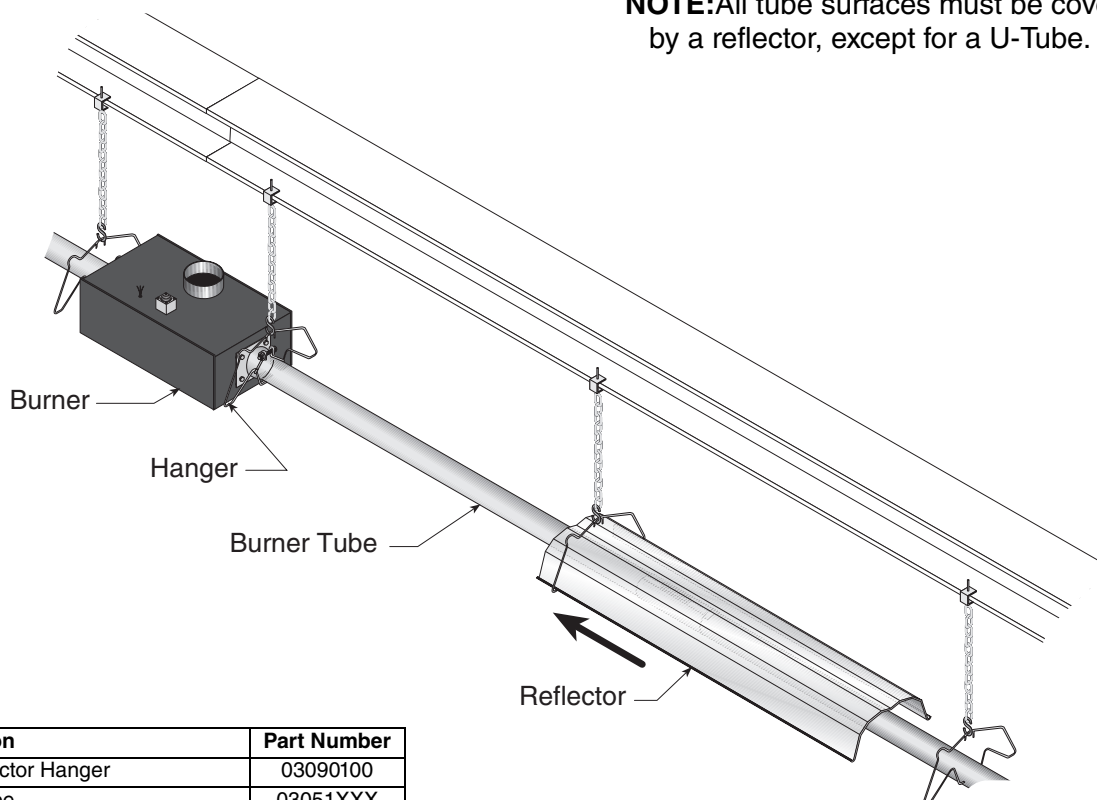
Step 7.5 Turbulator Installation



Description	Part Number
Turbulator Adapter	03051503
Turbulator Section 2.5'	03051504
Tube	91409XXX

Step 7.6 Reflector Installation

NOTE: All tube surfaces must be covered by a reflector, except for a U-Tube.



Description	Part Number
Tube/Reflector Hanger	03090100
Burner Tube	03051XXX
Reflector	02750303

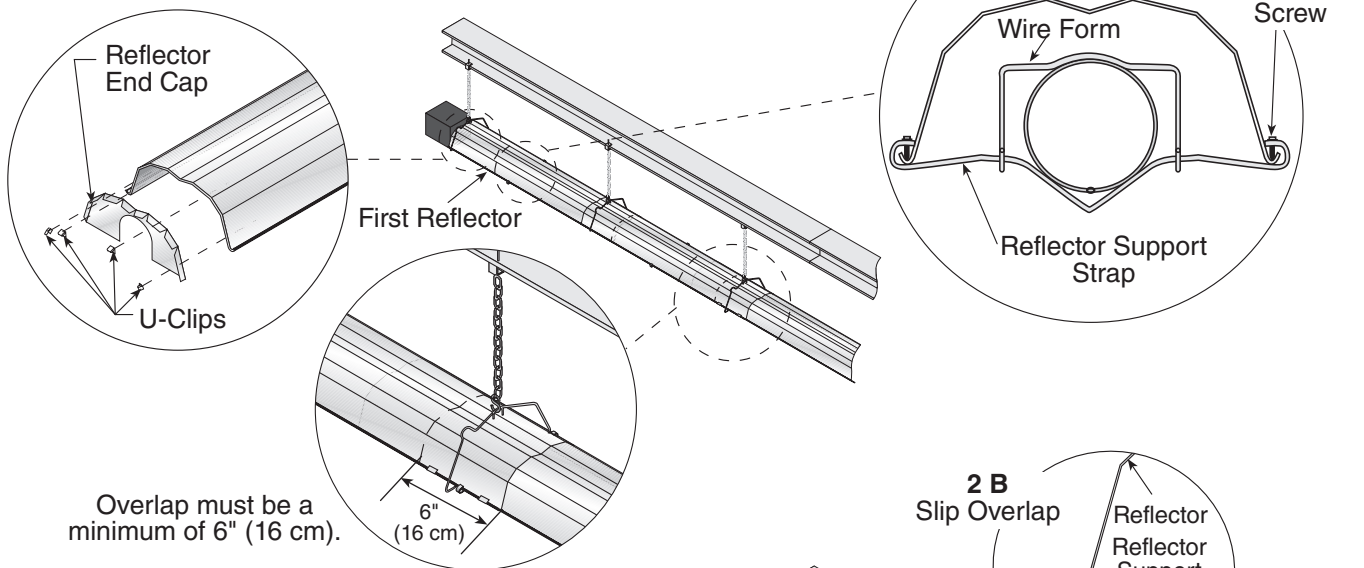
Step 7.6.1 Reflector, U-Clip and Reflector Support Installation

The pictorial drawings of the heater construction in *Section 7* are schematic only and provide a general guideline of where hangers, reflector supports and U-clips are to be installed.

To ensure proper expansion and contraction movement of the reflectors, a combination of U-clips and reflector supports are used. The positioning of

reflector supports and U-clips depends on the individual installation. Use either pop rivets or sheet metal screws instead of u-clips when installing end caps and joint pieces in areas where impact and high wind may be a factor. The following rules must be observed.

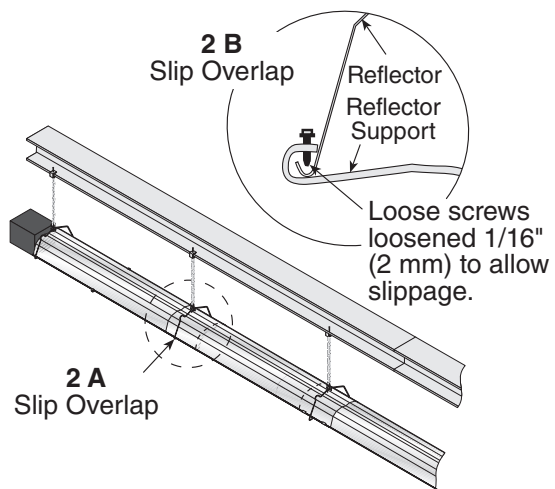
1. The first reflector after the burner must be affixed in the middle of the reflector with a reflector support and tight screws.



2. The overlap at the first and second reflector is a **slip overlap**.

Thereafter, every third reflector joint is a slip overlap. A slip overlap is achieved by either:

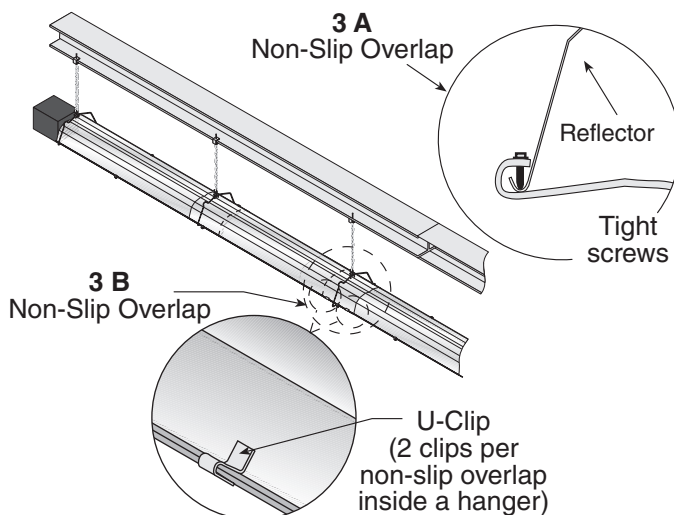
- a.) both reflectors lay inside a hanger.
(No reflector support needed.)
- b.) using a reflector support with loose screws at the reflector overlap.



3. The remaining reflector overlaps require a **non-slip overlap** connection. To affix the reflectors together in a non-slip overlap either:

- a.) use reflector support and tight screws.
- b.) if both reflectors lay inside a hanger, u-clips or sheet metal screws may be used.

This section of three reflectors joined together must be affixed to the tube with at least one reflector support with tight screws.



Description	Part Number
Reflector Support Package	03050010
Wire Form	91908004
Reflector Support Strap	03050000
Screw #8 x 3/4	94320812
U-Clip Package	91107720
Reflector End Cap	027508XX